ORIGINATOR	PROCEDURE
Director, Bureau of Highway Development	13-1-21
CHAPTER 13	Drainage
SECTION 1	Drainage Practice
SUBJECT 21	Precast Box Culverts

Precast box culverts are one of the large drainage conduit alternatives the designer may choose to resolve a given drainage problem. The choice of this option should be based on the criteria given in Procedure 13-1-20 as well as sound engineering judgment. One factor that must be considered is earth cover. Fill height criteria for similarly sized cast-in-place culverts may be used, except precast box culverts may be used only in those situations which provide for at least two feet **(600 mm)** of earth cover under the traffic areas.

The broad range of sizes offers the designer many choices when studies indicate large drainage conduit is suitable. Multiple cell installations are permitted.

When determining whether a box culvert should be precast or cast-in-place, an analysis should be conducted to compare the options. This analysis should attempt to identify all the factors involved, including costs, many of which are not readily apparent.

Generally, initial cost of a cast in place box is less expensive than a precast box culvert. However, precast box culvert installation can be completed in a much shorter time than a cast-in-place option. This is especially of value where a detour is not feasible, and a short term closure can be allowed. Precast box culverts may be used in emergency situations. In situations where complete closure is impossible, precast units can be used in a bypass, and then left in place or reset to a new position. Some local roads can carry detour traffic for short durations, but cannot sustain long term use without costly maintenance and repair. Road user costs, such as delays due to indirection, may be a factor. Grading projects may realize a cost advantage by providing early access to an entire project, expediting movement of embankment materials and other construction operations. The minimum time and amount of disruption to streams is an easily identified positive environmental aspect.

Quality control of materials and curing conditions is an advantage to casting the units in a plant environment. The dry mix used in the units yields a denser, less permeable concrete than the cast-in-place option.

End treatments may be precast, cast-in-place, or a combination of both.

At present only the following sizes of precast box culvert may be specified:

Table 1 - Allowable Precast Box Culvert Sizes

Span X Rise	Span X Rise
6 ft. x 4 ft.	**1.83m x 1.22m**
7 ft. x 6 ft.	**2.13m x 1.83m**
8 ft. x 6 ft.	**2.43m x 1.83m**
8 ft. x 8 ft.	**2.43m x 2.43m**
10 ft. x 6 ft.	**3.05m x 1.83m**
10 ft. x 8 ft.	**3.05m x 2.43m**
10 ft. x 10 ft.	**3.05m x 3.05m**

Since the plans for a specific precast box culvert are developed based on a general plan insert drawing, there are no special data requirements for this type of structure. If the designer wishes to use a precast box culvert in a given situation, the district shall so advise the Structures Design Section, in the Bureau of Highway Development. They will furnish the necessary standardized plan insert sheets. ★